

The future of decentralised infrastructures will depend on the one hand on how individual enterprises are structured, how they respond to their customers' requirements and, in doing so, how they make the most of their strengths and minimise or compensate for their weaknesses. On the other, it will depend on how they cope with the competing demands of business goals, changes in national and international operating conditions and the challenges of the future. We therefore paid special attention to examining how decentralised infrastructures contribute toward essential climate protection and resource conservation. Steadily rising demands as regards the quality of services and products were also explored. We used scenarios as an aid to identifying the opportunities and threats for municipal infrastructure enterprises, and paid close attention to models, instruments and quality assurance of infrastructure services that support ecologically, economically and socially sustainable development.

The INFRAFUTUR research partnership was designed to run for a three-year term, a relatively long period compared with short-term business consultancy. This made it possible to adopt a very thorough research approach, combining time-consuming methods with extensive, in-depth dialogue and discussion processes that are not feasible in the context of "normal" research and consultancy projects. The research partners' **core questions** were:

- Does decentralised organisation stand out as a guiding principle?
- Can the expansion of decentralised infrastructures be a crucial foundation for sustainable, comprehensive quality assurance in the energy, water/sewage and waste sectors?

Naturally, we can only give a synopsis of the INFRAFUTUR research partnership's findings in this brochure. Those who wish to know more are referred to the summary report and the separate volumes on the individual sectors.

www.infracfutur.de

Prospects for Decentralised Infrastructures

How to protect the climate and improve quality of service in a competitive environment?

*Approach and results of the
Research Partnership INFRAFUTUR*



Summary

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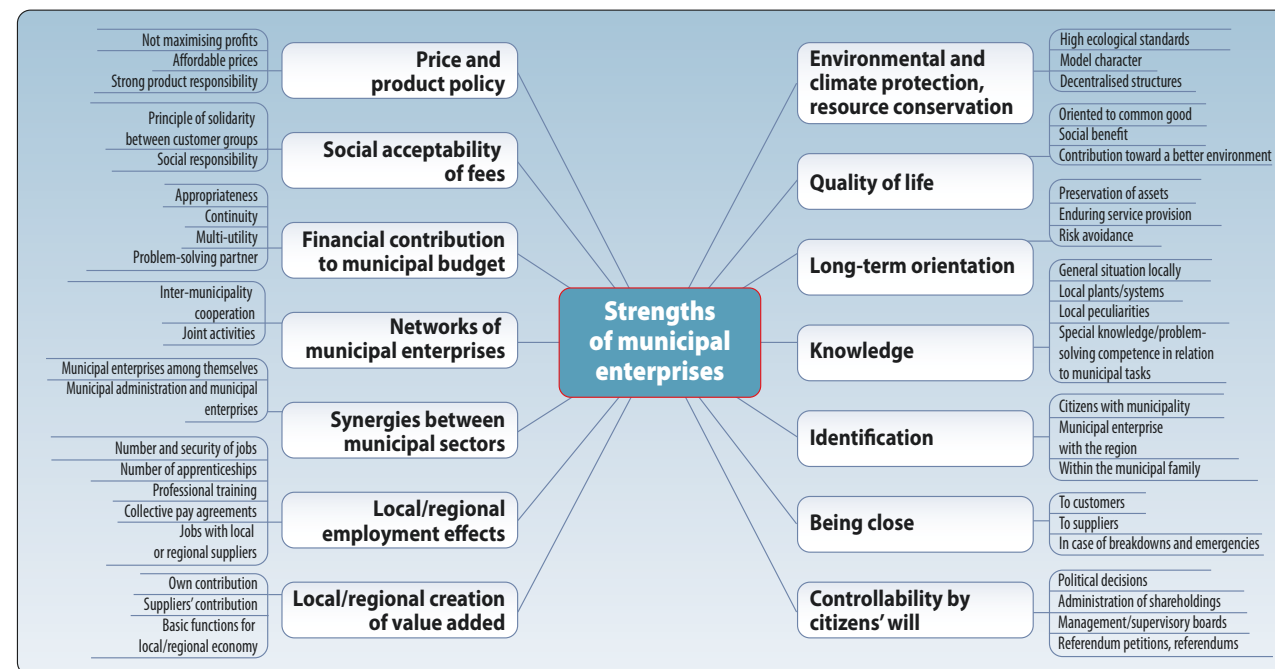
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Decentrally organised general interest services that are provided by municipal enterprises

- Transcend one-sided orientation toward short-term company profits and contribute toward the common good
- Encourage a diversity of players (in favour of competition for innovation and quality, and of realising the goals of sustainable management of natural resources)
- Can limit the spread of oligopolistic structures in competitive markets and help to weaken market-dominating positions
- Strengthen relations with customers
- Create the conditions for asserting the primacy of policy in energy and resources matters,
- Open up the potential synergies of multi-utilities
- Mobilise endogenous local potential for renewable energies and materials, and for energy and materials efficiency
- Replace the import of energy and raw materials by national/regional value creation.

Municipal enterprises will continue to serve local needs

In this paper we report on the approach and findings of the research partnership “Prospects for decentralised infrastructures amid the competing demands of competition, climate protection and quality (INFRAFUTUR).” INFRAFUTUR stands for the future of decentralised infrastructures. We asked which strategies would be appropriate to safeguard supply and disposal services in the energy, water/sewage and waste sectors to private households and business on an enduring basis. In doing so, we focused our analysis on municipal and mixed municipal-private enterprises as players.

The future of decentralised infrastructures will depend, on the one hand, on how individual enterprises are positioned, how they respond to customers’ requirements and, in doing so, how they make the most of their strengths and minimise or compensate their weaknesses. On the other, it will depend on how they cope with the competing demands of business goals, changes in national and international operating conditions and challenges of the future. We therefore paid special attention to examining their contribution toward the essential goals of climate protection and resource conservation. Steadily rising demands as regards quality of services and products were also explored. We used qualitative scenarios to identify the opportunities and threats ahead for municipal infrastructure enterprises. We paid close attention to targets, instruments and quality assurance for infrastructure services that support an ecologically, economically and socially sustainable development.

The INFRAFUTUR research partnership was designed to run for a threeyear term, a relatively long period compared with short-term business consultancy. This enabled adopting a very thorough research approach, combining time-consuming methods with extensive, indepth dialogue and discussion processes that are not feasible in the context of “normal” research and consultancy projects. The research partners’ core questions were:

- Does decentralised organisation stand out as a guiding principle?
- Can expanding decentralised infrastructures be a decisive basis for sustainable, comprehensive quality assurance in the energy, water/sewage and waste sectors?

Naturally, we can only present a synopsis of the INFRAFUTUR research partnership’s findings in this brochure. Those who would like to know more are referred to the summary report and the separate volumes on the individual sectors.

The summary report (available in German only) can be purchased via book retail, cf. Richter, Nikolaus; Thomas, Stefan; et al.; Perspektiven dezentraler Infrastrukturen, Frankfurt am Main 2008.

Sector reports (Energy, Water/Sewage and Waste; in German language, too) can be purchased from the Wuppertal Institute, cf. www.infracatur.de.

What is decentralised infrastructure?

Anyone wishing to examine the future of decentralised infrastructure enterprises must start by clarifying what they mean by “**decentralised**” and “**infrastructure**.”

Within the framework of the INFRAFUTUR research partnership, we considered the energy, water/ sewage and waste sectors at municipal and regional levels, including in some cases their interaction with other municipal services of general interest. Within these sectors, the following were counted as infrastructure:

- **Structural and technical plant** including facilities and equipment (e.g. power, gas, district heating, or water and sewerage networks, power stations, waste incinerators, or the fleet of vehicles required for waste disposal);
- The **products and service activities needed** to provide the infrastructure services required by businesses and households to the required standard. Thus, Infrastructure does not only refer to physical networks or logistical plans, but particularly to ensuring that the necessary heat, light or power is available to the public and to enterprises, to recycling or disposing of the waste generated, and to doing all this in as environmentally- and climate-friendly a way as possible at the lowest possible cost;
- The **specific organisations and regulations** for operating municipal services of general interest (that is municipal enterprises and their boards and the award of contracts by the respective local authority),
- And their **personnel** (number and skills of employees).

We also include integrated aspects extending beyond individual sectors. We considered municipal services of general interest as an optimising, dynamic system that is used among other things to unlock synergies.



RSAG (Siegburg) waste collection vehicles



Landfill gas is used for cogeneration in Hamburg



Water tower in Emden



AWA Entsorgung (Eschweiler) collection of toxic substances



Comfort

In addition to defining the term “infrastructure” it was necessary to define when infrastructure should be described as **decentralised**. The INFRAFUTUR research project considered three aspects:

- The technical design of plant,
- The locality in which demands are met and
- Decision-makers’ links with the municipality.

We chose a mixture of these three criteria, with the **main emphasis on decision-makers’ links with the municipality**:

Thus, infrastructure should be regarded as **decentralised** if decisions are taken at regional or municipal level or by companies whose market share does not signify a dominant position in the national market as a whole, and that gear their decisions and the plant and equipment employed primarily to meeting local or regional demand. This includes that also significant activities extending beyond the municipal boundary can be decided locally, as long as they serve to strengthen sustainable local or regional economic activity and contribute toward public value.

This definition refrains expressly from restricting decentralisation to an individual local authority. A decision may be taken at local authority level for municipal enterprises to realise an infrastructure project jointly, or for local authorities to transfer a specific infrastructure service to a Zweckverband, or joint association set up for that purpose. Thus **cooperation between local authorities** is a core aspect of a decentralised decision-making structure.

However, decision-making is only decentralised if fundamental decisions on the content and price of the infrastructure offering are actually made in the individual local authorities. If such decisions were taken at the joint enterprise level without referring back to the local authority shareholders, one would have to examine on a case-by-case basis whether the scale of the project (possibly in conjunction with other joint activities) should be regarded as significant for the market as a whole. Nor should activities of this kind be classified as decentralised if they set in motion an entrepreneurial growth process that results in a development comparable in form and content to that of a large group enterprise. It is not easy to draw the distinction in individual cases, but the above-mentioned criteria can be a very useful aid to assessment.

What are the advantages of decentralised infrastructure?

The decentralised provision of general interest services by municipal enterprises is of **fundamental importance** for social and economic development, for several reasons:

- It transcends one-sided orientation toward short-term company profits that are distributed to shareholders (shareholder value) in favour of a contribution toward the common good (public value), for example toward safeguarding the environment by protecting the climate and conserving resources.
- It encourages a diversity of players, thereby optimising the conditions for competition on innovation and quality, and for realising the goals of sustainable management of natural resources.
- In competitive markets, it can limit the spread of oligopolistic structures and help to weaken market-dominating positions.
- It creates conditions for asserting the primacy of policy in energy and resources matters, thereby helping to maintain democratically legitimised control of the supply and disposal markets indispensable to a national economy.
- It strengthens relations with customers, unlocks the potential synergies of multi-utilities and mobilises endogenous local potential for renewable energies and materials, energy and materials efficiency, and the associated production processes and services.
- It enables positive net employment effects and reduces the import of energy and raw materials by creating value nationally or regionally in line with natural conditions of e.g. water supply and sewage treatment, thereby strengthening regional material and business cycles.

Municipal enterprises have a variety of strengths (see chart on Page 1). However, these strengths are often only fully appreciated after the enterprises have ceased to exist (e.g. after privatisation).

Municipal network operator or logistics provider	Municipal full service provider	Regionally expanding municipal enterprise
Concentration on public service/licensed fields of activity	Preservation and increase of local strength by means of quality leadership	Expansion on the basis of local/regional strength
No own generation or waste treatment (at most assistance to the municipality in selecting partners)	Own generation or waste treatment in own area (or in the immediate surroundings), participation in inter-municipality generation/treatment capacity (with the aim of spreading risks)	Supra-regional location optimisation; own production regionally dispersed, but often with a local focus in specific regions, active role in creating inter-municipal generation capacity.
Sale of connection services (to improve utilisation of network capacity or logistics)	Quality leader or dominant market leader in own area, supplies outside the area only in exceptional cases (e.g. composite customers with headquarters in the municipality or under a municipal cooperation agreement)	Expansive selling anchored in local/regional base (but no expansion of sales at the cost of earnings)
Development of new services only in connection with network operation or performing public service task	Active market penetration and great willingness to innovate (including activities with a low short-term, or no, contribution to profit; partner of the municipality in implementing local climate and environment protection policy)	Expansion of services regionally and supra-regionally (though supra-regionally only cost-efficient activities – or as a unique selling point in competition, to win over municipal decision-makers)
No expansion of business activity	Development of further business fields as a partner of the municipality and of local enterprises (e.g. in the fields of housing or industrial area development, economic development, cooperation with municipal housing management)	Development of additional of business fields as a partner of local authorities and business enterprises (insofar as cost-effective)
Participation in purchasing/service syndicates (to reduce costs of procurement and to form cost-efficient service units)	Cooperation agreements with the aim of reducing own costs and for supra-regional self-production	Main player in cooperation agreements with an unlimited content (with the goal of creating a countervailing power to the large corporations), assumes operational management of municipal enterprises
No cooperation agreements with other market participants (pure principal/contractor relationship, with possible local/regional preferences)	Aspires to cooperation agreements at various levels to cover the value chain in the case of new services (e.g. with trades, technology providers, buyers)	Value chain is covered by integrated products and services from a single source, including outside the home area

Naturally, municipal infrastructure enterprises do not have only advantages. Weaknesses ascertained were taken into account in strategy development.

We analysed the strengths and weaknesses of **three basic types of enterprise positioning** representing typical municipal enterprise constellations. We distinguished between:



Cooperation between municipal utilities



Multi-utility in Heidelberg



Wind farm in Emden



Fleet vehicle types of Stadtreinigung Hamburg



Second-hand furniture shop in Hamburg

- A **municipal network operator or logistics provider** that confines itself, for example, to connecting consumers to the local energy distribution network or to waste collection and removal.
- A **municipal full service provider** that offers the municipality the entire bandwidth of decentralised infrastructure in the sector(s) concerned.
- A **regionally expanding municipal enterprise** that tries to market at least some of the products and services offered in its own municipality in other areas as well.

Experience tells that, given concentration of economic power, the abovementioned positive contributions by and prospects for decentralised infrastructures will not emerge automatically. Rather, conditions conducive to them must be created at EU and national level by adopting enabling climate, energy, waste and water policies.

What are the challenges for the future?

In addition to internal business analysis, it was important to study the development of external factors so as to classify the opportunities and threats arising from that development. This was done on the basis of projective scenarios, the relevant areas of which determine trends in the individual sectors' development. These scenarios are qualitative, consistent portrayals of the development of external factors during the next ten years, and not quantitative projections of possible futures.

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Synergies benefit local people and the local economy



Waste disposal at the Munich Oktoberfest



Using sewage gas in Heidelberg



Day of general interest services in Munich



Waste incineration and power station in Wuppertal

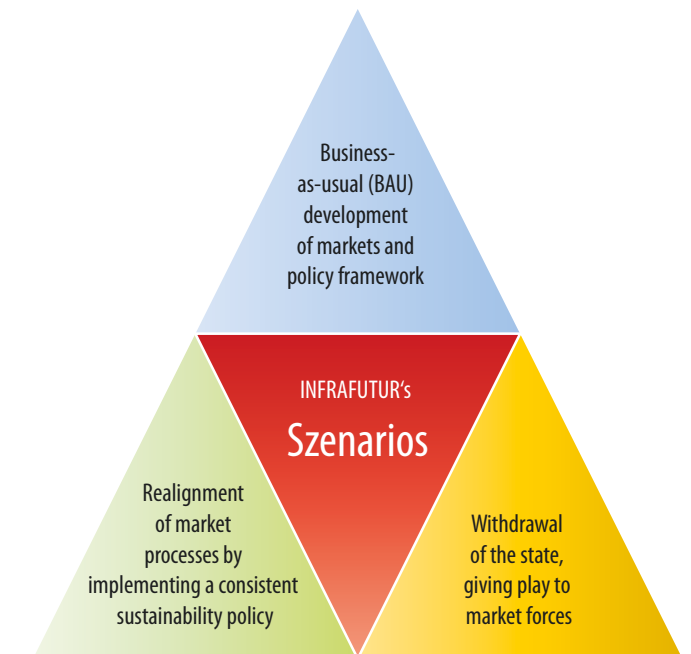
We analysed three consistent scenarios for each sector in parallel:

Szenario 1

Business-as-usual (BAU) development of markets and policy framework (with potentially opposite trends in the areas of competition and ecology). Politicians and authorities act inconsistently, in addition to which there may be major differences in the paths of development of different federal states and between individual local authorities.

Szenario 2

Realignment of market processes by implementing a consistent sustainability policy, in response to ecological and other demands, e.g. looming raw materials crises. This entails consistent realignment of different policy fields to take account of the need to conserve resources. It also involves creating the necessary conditions for implementation (e.g. by safeguarding the activities of municipal enterprises in municipal and tax law, both in terms of supporting them as necessary market partners for local or regional ecological processes and as necessary competitors for group enterprises). Any competition that exists is designed in an ecologically and socially responsible way (and this is safeguarded by the law).



Szenario 3

Withdrawal of the state, giving play to market forces, i.e. through liberalisation, privatisation and general deregulation (simultaneously imposing more stringent regulation in the absence of competition). The actions of politicians and authorities (including regulatory and control institutions) are geared to reducing prices and fees as input prices for companies and as a factor determining the disposable income of private households. Instruments are used consistently (for example, efforts to open up markets to private companies are supplemented by privatisations and municipal law restrictions on the economic activity of municipal enterprises, and through the practice of local authority supervision). Increasing international competition goes hand in hand with a reduction in the number of national providers.

These three scenarios cover the bandwidth of assumed future development in each sector, and thus simultaneously the competing demands of competition and climate protection/resource efficiency, amid which the quality of service is, if possible, meant to be maintained or improved.

We identified, analysed, bundled and weighted the opportunities and threats for municipal enterprises that could be deduced from these scenarios. Regardless of the scenarios from which they were developed they were then compared with the municipal enterprises' strengths and weaknesses in SWOT (strengths, weaknesses, opportunities and threats) tables.

We produced three SWOT tables for each sector, one for each of the abovementioned three basic types of enterprise positioning. The SWOT analysis findings, along with findings on international (and national) experiences of liberalisation and deregulation, and with possible synergies resulting from greater cooperation between different municipal business sectors, were then fed into the development of strategies.

Both for producing SWOT tables and for interpreting the results it was important to ascertain external developments independently of the basic type of enterprise positioning. Therefore, unlike in the case of internal analysis, it did not make sense to differentiate the external factors between the three basic types of enterprise in each sector, because any future conditions that may result from externally determined factors are of course the same for all three basic types. This made it possible to identify the effects of different enterprise positionings.

What are our strategic recommendations?

In the sector studies, we developed strategies for the individual basic types of enterprise positioning in relation to the different scenarios. Overall, a large number of possible strategies emerged.

The overview below includes some strategies that indicate a change in the basic type of enterprise alignment. These are shown in italics.

INFRAFUTUR – Overview of possible strategies				
	Scenarios	Municipal network operator or logistics provider	Municipal full service provider	Regionally expanding municipal enterprise
Waste	Business as usual	Alternative possibilities: <ul style="list-style-type: none">• Expand waste-to-resources activities in logistics• Service-oriented household-related logistics• Develop into full service provider	Expand regional services	Expand regional services plus strategy to offer specialist services nationwide
	Sustainability	Expand waste-to-resources activities in logistics	Waste management as raw materials management	Waste management as raw materials management plus nationwide marketing of final products
	Market forces	Alternative possibilities: <ul style="list-style-type: none">• Service-oriented household-related logistics• Develop into full service provider	Waste treatment with competitive prices and high standards	Waste treatment with competitive prices and high standards, plus supra-regional acquisition of bulk waste
Synergies with Energy / Water				
Water / Sewage	Business as usual	Efficiency and quality offensive	Efficiency and quality offensive	Efficiency and quality offensive in the region
	Sustainability	Innovator for the good of the municipality (with limited possibilities)	Innovator for the good of the municipality	Innovator for the good of the region
	Market forces	Possible in combination: <ul style="list-style-type: none">• Reduce costs while largely retaining and communicating high quality standards• Develop into full service provider	Reduce costs while largely retaining and communicating high quality standards	Possible in combination: <ul style="list-style-type: none">• Reduce costs (inter alia by expansion) while largely retaining and communicating high quality standards• Move away from supra-regional competition by developing into a local full service provider
Synergies with Energy / Waste				
Energy	Business as usual	Alternative possibilities: <ul style="list-style-type: none">• Network operator for sustainability• Reduce costs and communicate quality• Develop into full service provider	Own generation and energy services – moderate	Own generation and energy services – moderate
	Sustainability	Network operator for sustainability	Own generation and energy services – with sustainability as the goal	Own generation and energy services – with sustainability as the goal
	Market forces	Possible in combination: <ul style="list-style-type: none">• Reduce costs and communicate quality• Develop into full service provider	Reduce costs and communicate quality	Possible in combination: <ul style="list-style-type: none">• Reduce costs and communicate quality• Retreat to position of full service provider
Synergies with Waste / Water				

Of course, the range of strategies that can be developed in specific enterprises is narrower, since the starting point is the actual situation in the specific enterprise (and not a type of enterprise). Moreover, it is not usual to assess the entire range of possible future circumstances in a specific enterprise, but only those that are held to be individually probable, taking into account the plausibility of the consequences to be feared if key basic assumptions concerning future external developments should turn out to be wrong.

We outline below some sample strategies developed for the individual sectors. For selected strategies only, we devised a package of measures for implementation, analysed conditions for implementing them and defined milestones. We also describe some sample packages of measures, one for each sector examined. The sector reports include full documentation of the strategies developed and packages of measures.

Energy sector

In the energy sector, we analysed the packages of measures listed in the overview on the following page. As an example of a strategic package of measures for the energy sector, we describe Energy Services (ES) for the municipal full service provider in the sustainability scenario.

A local full service provider pursues a sustainable corporate energy policy by diversifying its sources of supply, using local potential for renewable energy, expanding decentralised combined heat and power generation, and developing customers’ existing energy efficiency potential. When developing and expanding services specific to customer groups, the full service provider can take all the said fields of action into account. As a rule, the expansion of energy services is highly economical from the customer’s point of view, as well as being necessary in terms of climate protection policy. Depending on the framework conditions (see below), it also makes economic sense for the full service provider (because it expands the value chain). At the same time, the many and diverse contacts with local customers are a competitive advantage for a municipal multiutility enterprise over external energy providers that do not have the same diversity (power, gas, water, heat), continuity and intensity of customer contacts at their disposal.

Strategic packages of measures for the energy sector			
Scenarios	Municipal network operator	Municipal full service provider	Regionally expanding municipal enterprise
Business as usual	Develop into full service provider 1. Package of measures for this strategy	Own generation and energy services – moderate <i>Transferable after adjustment:</i> 1. Own generation 2. Energy services	Own generation and energy services – moderate <i>Transferable after adjustment:</i> 1. Own generation 2. Energy services
Sustainability		Own generation and energy services with the goal of sustainability 1. Own generation 2. Energy services	Own generation and energy services with the goal of sustainability <i>Transferable after adjustment:</i> 1. Own generation 2. Energy services
Market forces	Reduce costs and communicate quality <i>Transferable after adjustment:</i> 1. Reduce costs 2. Communicate quality Develop into full service provider 1. Package of measures for this strategy	Reduce costs and communicate quality <i>Transferable after adjustment:</i> 1. Reduce costs 2. Communicate quality	Reduce costs and communicate quality 1. Reduce costs 2. Communicate quality

Consequently, most energy efficiency and carbon dioxide reduction potential in the energy field can be tapped more completely and efficiently at the local or regional level. Moreover, the offer of energy services can strengthen customer loyalty and enhance customer satisfaction because a strategic energy efficiency improvement at the customer’s end may make it possible to cushion necessary price increases, thereby stabilising supply relationships and acceptance. In addition, from the point of view of the municipal shareholder and the “local authority as a group enterprise” a diversified offer of energy services by the municipal full service provider benefits the business location. It can help to balance the import of expensive energy into the region with a higher proportion of regional value creation and with purchasing power and/or multiplier effects. Excellent services provided by a local energy provider can also be a positive factor in location marketing, in helping to attract businesses to locate, or for innovative suppliers or spin-offs of scientific establishments in the region.



District heat in Magdeburg



Waste collection vehicles in Aachen

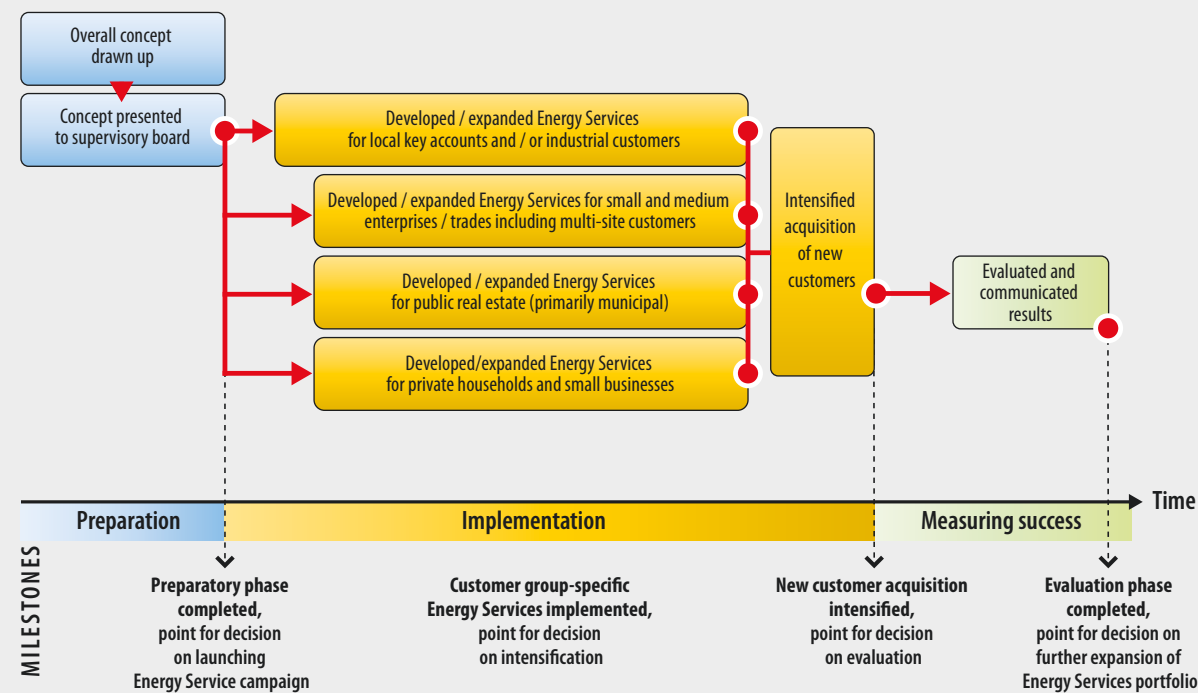


Wind turbine on former landfill site in Munich



Using hydroelectric power in Munich

Milestones for the Energy Services package of strategic measures



It is important that the enterprise offer services that are as “customised” as possible. The full service provider’s service portfolio will cover at least the follow groups of customers:

- Local major customers or industrial customers
- Small and medium-sized enterprises / businesses including multi-site customers
- Public properties and real estate and
- Private households and small businesses



Using geothermal power in Munich



Wind farm in Emden



Maintenance work



Natural gas pipes



Switching station

As regards the services offered, the following basic distinctions must be drawn:

- **Electricity end use efficiency services** (e.g. in the fields of ventilation, air-conditioning, compressed air, lighting, pumps, but also load management)
- **Gas and heat/cooling services** (e.g. provision of useful heat for residential buildings)
- **Systemic services** (also in collaboration with other sectors), e.g. to optimise industrial processes (production processes) in the application and technology areas of power, space heat, process heat, cold, compressed air, drinking water, industrial water, gas, facility management, in-plant logistics, in-plant disposal, and sewage)
- **Analyses, expert reports and consultancy** (e.g. energy concepts for industrial sites).

For the energy enterprise to be economically attractive, it is also important to distinguish between services paid for directly by customers (such as energy performance contracting or energy supply contracting) on the one hand and free advice to customers, incentive programmes and similar services on the other. Services that are paid for can be very economically attractive, especially at larger customers. Free advice can be supported by its contribution toward customer loyalty and customer satisfaction. In the case of large-scale incentive programmes, however, it is important for the enterprise to have a legal guarantee that the cost of the programme will be reimbursed, as is assumed in the sustainability scenario. The money could come from a government energy efficiency fund or be raised via network charges or energy prices.

Strategic packages of measures for the water and sewage sector			
Scenarios	Municipal network operator	Municipal full service provider	Regionally expanding municipal enterprise
Business as usual	Efficiency and quality offensive with continuous development towards sustainability 1. Cross-sector planning and implementation of refurbishment <i>Transferable after adjustment:</i> 2. Continuous and transparent sustainability reporting	Efficiency and quality offensive with continuous development 1. Continuous improvement of services 2. Continuous and transparent sustainability reporting	Efficiency and quality offensive in the region with continuous development towards sustainability 1. Assessment of potential areas for expansion and acquisition of operator contract if positive <i>Transferable after adjustment:</i> 1. Continuous improvement of services 2. Continuous and transparent sustainability reporting
Sustainability	Innovator for the good of the municipality (with limited possibilities) <i>Transferable after adjustment:</i> 1. Participative water and sewage infrastructure planning 2. Merge water and sewage networks in one company	Innovator for the good of the municipality 1. Participative water and sewage infrastructure planning 2. Merge water supply and sewage treatment in one company 3. Sustainable and integrated local concept with adapted incentive structures	Innovator for the good of the region <i>Transferable after adjustment:</i> 1. Participative water and sewage infrastructure planning 2. Merge water supply and sewage treatment in one company 3. Sustainable and integrated local concept with adapted incentive structures
Market forces	Reduce costs while largely retaining and communicating high quality standards <i>Transferable after adjustment:</i> 1. Increase economic efficiency through benchmarking 2. Increase economic efficiency through use of synergies with other municipal sectors	Reduce costs while largely retaining and communicating high quality standards 1. Increase economic efficiency through benchmarking 2. Increase economic efficiency through use of synergies with other municipal sectors	Reduce costs (inter alia by expansion) while largely retaining and communicating high quality standards <i>Transferable after adjustment:</i> 1. Increase economic efficiency through benchmarking 2. Increase economic efficiency through use of synergies with other municipal sectors

Water and sewage sector

For the **Water and Sewage sector**, in the business-as-usual (BAU) scenario the example chosen from the range of strategies and packages of measures shown in the overview on the following page is Continuous Improvement in Services in the context of the full service provider’s “efficiency and quality offensive” strategy. This BAU scenario is generally considered as highly probable for the water sector.



Public swimming baths in Munich



Water containers in Heidelberg



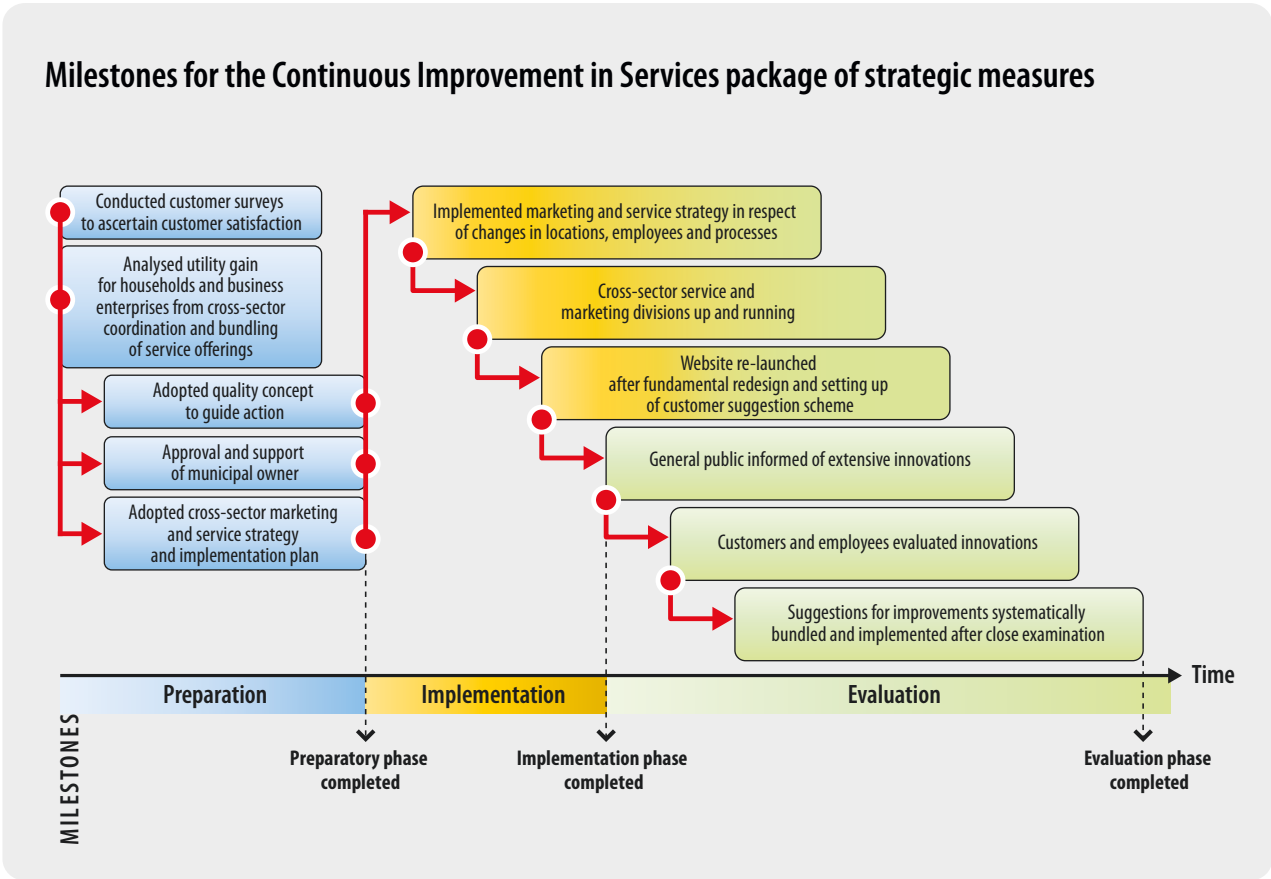
Water pipe construction site in Leipzig



Sewer in Magdeburg



Sewage sludge digestion in Magdeburg



A noticeably high quality of service unlocks important potential for standing out from private sector water companies while simultaneously refuting the stereotype of the “overbureaucratic” public enterprise. Here, municipal water companies can focus on two important strengths, their closeness to customers and their collaboration with other municipal sectors.

The main components of the package of measures proposed for Continuous Improvement in Services are aimed at addressing two key parameters of significance for infrastructure costs:

- A medium-term **cross-sector refurbishment and renewal plan whereby joint underground engineering** enables cost efficiency benefits and which is coordinated to tally with municipal building works, and
- Close **collaboration** between those in charge of the gas, electricity, and water/sewage infrastructure **and the municipal planning department**. This is extremely important for medium- to long-term infrastructure costs.

Both measures are essential for curbing infrastructure costs and will almost inevitably rely on the local strength of integration into political decision-making processes and closeness to other municipal enterprises.

Development of sustainable water and sewage infrastructure calls for long-term planning that takes account of both long-term demographic and climate changes and medium-term developments at the neighbourhood level. A medium- to long-term refurbishment and maintenance plan is produced on this basis. It is closely coordinated with municipal road works and other infrastructure systems and if need be also includes low-threshold offers for property owners. At a further stage, the aim will be for the infrastructure enterprise to play a greater role in the town planning processes.

Waste sector

We developed a total of eleven strategic packages of measures for municipal waste management (see overview on the next page). By way of example, we describe here the Use of Biomass as a Renewable Energy as part of the municipal full service provider’s “waste management as raw materials management” strategy. The background to this is political calls for the waste management industry to contribute toward climate protection by means of energy recovery based on renewable raw materials.

The municipal waste management enterprise develops the use of biowaste to generate energy as a new line of business (see also Waste to Energy package of measures). Given political climate protection requirements and continuously rising energy prices, anaerobic fermentation of biowaste offers considerable ecological and economic potential.

The trend is already foreseeable. The number of fermentation plants in Germany has tripled since 1996. Even so, only 10% of biowaste plants include an anaerobic process step. The collection of biowaste in households can also be considerably expanded by organising separate collection.

When biowaste, plant cuttings or food waste (that may no longer be used untreated for animal feed) is fermented, methane-containing gases are formed by microbial metabolism in various processes (dry fermentation, wet fermentation, etc.*). If this is fed into the grid, depending on the process, under the German Renewable Energy Act various feed-in allowances can be claimed (minimum biomass allowance, innovative technology bonus, combined heat and power bonus). These help to pay for the investment, while at the same time substantial contributions are made towards climate protection.

* While wet fermentation allows the use of liquid waste, such as manure, dry fermentation needs less extensive technical equipment and has lower operating costs.

Strategic packages of measures for the waste sector			
Scenarios	Municipal logistics provider	Municipal full service provider	Regionally expanding municipal enterprise
Business as usual	Expand waste-to-resources activities in logistics 1. Resource offensive 2. Service and quality offensive 3. Inter- and intramunicipal networking	Expand regional services 1. Waste to Energy 2. Citizen Value Reporting	
Sustainability		Waste management as raw materials management 1. 'Dry recyclables' container 2. Use of Biomass as a Renewable Energy 3. Resource flow management / Urban Mining 4. Waste minimisation / Climate change mitigation	
Market forces			Waste treatment with competitive prices and high standards, plus supra-regional acquisition of bulk waste 1. Operator Concepts 2. Economic efficiency strategy



Container service in Siegburg



RSAG waste workers

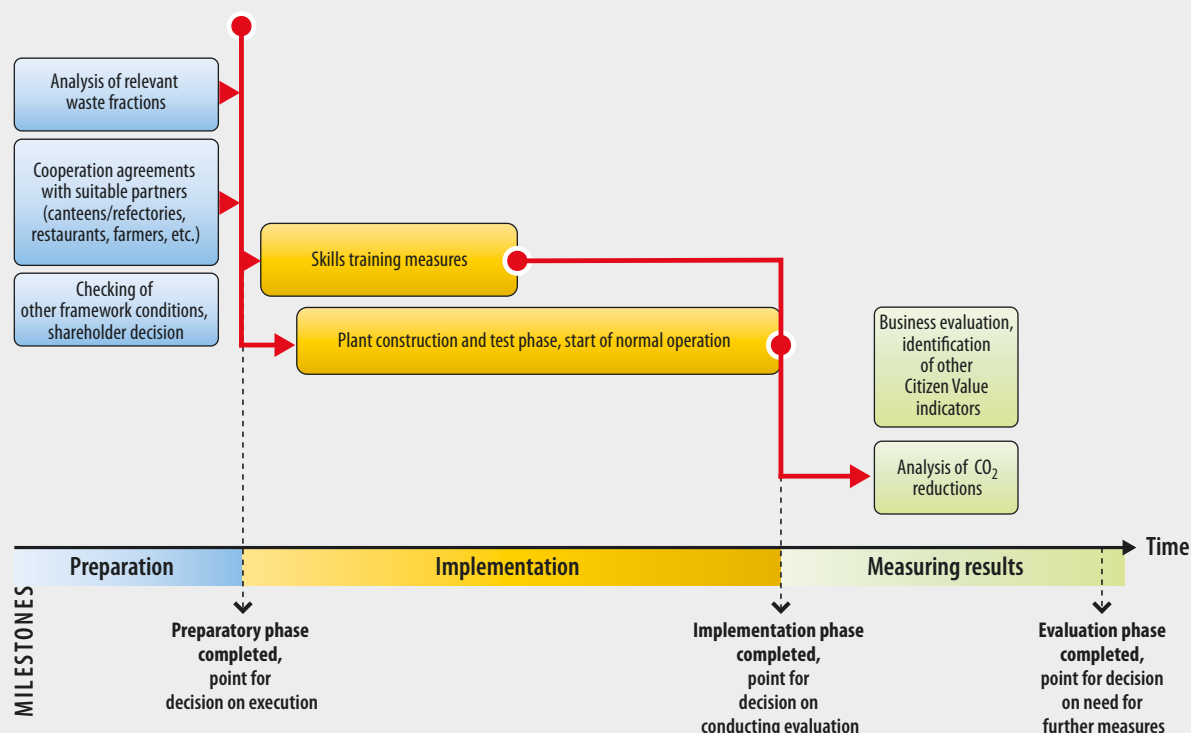


Paper recycling bin in Hamburg



Biowaste is turned into garden compost in Darmstadt

Milestones for the Biomass Use package of strategic measures



Since both investment costs and operating costs vary widely from process to process, the actual choice of a process provider must depend on the specific circumstances. The ideal prerequisites are a minimum volume of biowaste containing a high proportion of kitchen waste in relation to garden waste and a local buyer for the heat resulting from the process (combined heat and power). It is relatively easy to integrate anaerobic stages into existing composting works. Fermentation residues are also recycled in the composting works, if need be after further decomposing.

There are already established structures for recycling scrap wood, and these could be expanded, especially by stepping up the use of combined heat and power in scrap wood-fired cogeneration plants as one option for municipal waste management.

The findings are available and can be implemented

The INFRAFUTUR research partnership has provided participating enterprises with a wealth of findings to feed into the further development of their strategies. The publication of these findings will give other municipal enterprises the opportunity to share in the results. They can implement the methodology developed and many of the findings in their own enterprise, naturally adjusting them to specific local conditions.

In order to do so, one must first decide where the concrete enterprise fits into the spectrum of basic strategic orientations. Therefore, the process starts with a self-analysis of the current situation and the desired path of development. The research partnership has prepared extensive documentation that is designed to help with this and to ease the path from analysis via strategy development to implementation. We wish you every success!